

new issues requiring further search and/or consideration; (c) satisfies a requirement of form asserted in the previous Office Action; and (d) places the application in better form for appeal, should an appeal be necessary. The amendment is necessary and was not earlier presented because it is made in response to arguments raised in the final rejection. Entry of this amendment is respectfully requested. Reexamination and reconsideration in light of the above amendments and the following remarks is respectfully requested.

By the foregoing amendment, claims 1 and 14 were amended to recite “a maximum benefit router that receives the topic output and determines where to route the call in order to optimize at least one predetermined parameter, said telephone call routed based on maximum benefit.” (Emphasis added). Support for this amendment can be found variously throughout the specification, including for example, at paragraph 0022. Claims 1-18 and 20 are currently pending for the Examiner’s reconsideration, with claims 1, 14 and 16 being independent.

A. Rejections under 35 U.S.C. §102

1. Rejection of claims 1-8, 11, and 14-15

Claims 1-8, 11, 14 and 15 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,269,153 to Carpenter et al. Applicants respectfully traverse this rejection.

Claim 1 recites an automated call routing system that routes a telephone call by responding to a routing objective of a calling party, comprising: a speech recognizer that determines at least one phrase from a speech utterance made by the calling party and outputs a digital phrase; a topic identifier that receives the digital phrase and converts the digital phrase to at least one of a word stem and a word class and generates a topic output; and a maximum benefit router that receives the topic output and determines where to route the telephone call in order to optimize at least one predetermined parameter, said telephone call routed based on maximum benefit.

Claim 14 recites an automated call routing system that routes a call by responding to a routing objective of a calling party, comprising: a recognizer that determines at least one phrase

made by the calling party and outputs a second phrase; a topic identifier that receives the second phrase and converts the second phrase to at least one of a word stem and a word class and generates a topic output; and a maximum benefit router that receives the topic output and determines where to route the call in order to optimize at least one predetermined parameter, said telephone call routed based on maximum benefit.

Carpenter et al. '153 discloses methods and apparatus for call routing whereby a caller's response to a routing question is used to direct the call to a destination, and storing and processing caller contributions to each call. If the caller's response does not allow for unambiguous routing, the routing system poses clarifying questions to the caller, and these additional responses are used to refine the query for use in a subsequent attempt to rout the call. The primary objective of Carpenter et al. '153 is to eliminate ambiguity of the caller's routing request in order for the routing module to be able to route the call appropriately.

The Office Action alleges that item 412 of Carpenter et al. '153 is a maximum benefit router. This is incorrect. Carpenter clearly discloses that "The selection processor 412 compares the query-document score for each of the documents against a threshold for exactly one document, the routing module routes the call to the destination associated with the document whose score meets the threshold. If the query-document score meets the threshold for more than one document, the query is ambiguous, and the call is transferred to the disambiguation module 208." See col. 8, lines 59-67. Accordingly, the selection processor is determining if there is one unique destination that satisfies the document score, and if not, returns the query for additional information from the caller. This results in the call being routed only when there is a one to one correlation between the query-document score and a destination. Thus, Carpenter et al. '153 does not determine where to route a call based on maximum benefit. The score of the query-document is not a maximum benefit parameter.

The Office Action at paragraph 7 disagrees that Carpenter fails to disclose a maximum benefit router. However, the Office Action only discusses "router," not "maximum benefit router." As stated in Applicant's previous response, in contrast, claims 1 and 14 both require a

maximum benefit router that receives the topic output and determines where to route the call in order to optimize at least one predetermined parameter, said telephone call routed based on maximum benefit. As disclosed in the specification, for example, at paragraph [0010], a maximum benefit router

routes telephone calls based on the caller's goals and/or the benefit of routing callers to a customer care center most appropriate for retrieving a valid answer for the caller. In general, the cost or benefit is based on the fastest and least expensive way to answer a query posed by a caller. Using a probabilistic model of the caller's goals or call-topics based on a response to a top-level prompt, and a set of functions associating a utility or benefit with routing those call-topics to destinations within the center, the utility or benefit is measured according to a measurable criteria such as agent time saved. The invention selects the destination for each call that will have the maximum expected benefit. Stated simply, for example, when a caller has a question about billing, the call is best routed to a person who has special knowledge about billing, and most likely can answer the billing question in the shortest amount of time. If the billing question was routed to a person having special knowledge about, for example, installation, it most likely would take more time to answer a billing question, and the answer might not be as accurate. In this manner, questions about billing are routed to a person best equipped to answer the question according to the measured criteria, thereby freeing up a specialist that can answer installation questions from another call inquiring about installation.

Applicants have amended claims 1 and 14 to clarify that the telephone calls are routed based on maximum benefit. Accordingly, claims 1 and 14 clearly claim a maximum benefit router that routes telephone calls based on maximum benefit.

Accordingly, the maximum benefit router, and the routing of telephone calls based on maximum benefit, is not disclosed, taught or suggested by Carpenter et al. '153.

A document can only anticipate a claim if the document discloses, explicitly or implicitly, each and every feature recited in the claim. Verdegall Bros. v. Union Oil Co. of Calif., 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Since Carpenter et al. '153 fails to disclose, teach or suggest, either explicitly or implicitly, at least the above-noted feature recited in independent claims 1, and 14, Carpenter et al. '153 cannot anticipate the claims. At least in view

of the foregoing, claims 1, and 14 are allowable, and the rejection should be reconsidered and withdrawn.

Claim 3 recites the additional element of determining the best routing destination based upon the routing objective of the calling party distinguished from a second routing objective of a call center. As discussed above, Carpenter et al. '153 does not disclose, teach or suggest routing a call based upon the routing objective of the calling party distinguished from a second routing objective of a call center.

Claim 7 recites the additional element wherein entries in the benefit matrix define the benefit in seconds of agent time saved by routing the call to a first destination based upon a caller topic. The Office Action at page 6, lines 5-9 allege that this is disclosed in Carpenter et al. '153 at col. 2, lines 56-65. However, all that is disclosed in the reference is the routing of a call after the voice response is analyzed to an appropriate location, and if indeterminate, routing the call to a person. Carpenter et al. '153 does not disclose, teach or suggest that entries in the benefit matrix define the benefit in seconds of agent time saved by routing the call to a first destination based upon a caller topic.

Claim 8 recites the additional element wherein the maximum benefit router routes the telephone call based upon at least one of optimized time savings, optimized cost savings, optimized response quality and optimized resources. Rather, Carpenter et al. '153 teaches determining the caller topic for comparing to a predetermined list of routing terms, and does not disclose, teach or suggest routing a call based upon at least one of optimized time savings, optimized cost savings, optimized response quality and optimized resources.

The various dependent claims are independently patentable over Carpenter et al. '153. Therefore, withdrawal of the rejection is respectfully requested.

2. Rejection of claims 16-20

It is respectfully submitted that claim 19 was meant to be allowed by the Examiner since no basis for the rejection of claims 16-20 under Section 102 was given in the office action despite the inclusion of these claims in the overview statement of Paragraph 2 of the office action. Claim 19 was not rejected as being obvious based on any references in Paragraph 6 of

the office action. If the Examiner meant to reject claims 16-20 as being anticipated by a single reference, a new office action giving the basis for the rejection is respectfully requested. In particular, as stated at Paragraph 8 of the Office Action, "Applicant's {sic} arguments with respect to **claims 16-20** have been considered but are moot in view of the new ground(s) of rejections," but no new grounds of rejections are given for these particular claims as to Section 102.

B. Rejections under 35 U.S.C. §103

1. Claims 9 and 10

Claims 9 and 10 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,269,153 to Carpenter et al. in view of U.S. Patent No. 6,349,307 to Chen. Applicants respectfully traverse this rejection.

Chen '307 discloses the use of Bayesian decision theory to determine the likelihood factor based on the accuracy of each determination. See col. 5, lines 36 – 51. However, Chen '307 does not disclose, teach or suggest the use of Bayesian decision theory to optimize at least one predetermined parameter of the maximum benefit router and determining the overall risk, as recited in claim 9. Accordingly, Chen '307 does not make up for the deficiencies of Carpenter et al. '153, and a prima facie case of obviousness has not been established. Similarly, claim 10 recites that the minimum overall risk is the maximum benefit, which is not disclosed, taught or suggested by Chen '307 or Carpenter et al. '154, and Chen '307 does not make up for the deficiencies of Carpenter et al. '153, and a prima facie case of obviousness has not been established.

Still further, claims 9 and 10, being dependent upon claim 1, is also allowable for the reasons above. Moreover, this claim is further distinguished by the materials recited therein, particularly within the claimed combination. Withdrawal of the §103(a) rejection is therefore respectfully solicited.

2. Claims 12 and 13

Claims 12 and 13 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,269,153 to Carpenter et al. in view of U.S. Patent 6,295,533 to Cohen. Applicants respectfully traverse this rejection.

Cohen '533 discloses a system and method for accessing heterogeneous databases. The system is used to answer queries concerning information stored in the database. Cohen '533 does not disclose, teach or suggest maximum benefit routing as recited in the claims, rather, this reference is applied solely for disclosing a Porter stemming algorithm. Cohen '533 does not make up for the deficiencies of Carpenter et al. '153, and a prima facie case of obviousness has not been established.

Still further, claims 12 and 13, being dependent upon claim 1, is also allowable for the reasons above. Moreover, this claim is further distinguished by the materials recited therein, particularly within the claimed combination. Withdrawal of the §103(a) rejection is therefore respectfully solicited.

3. Claims 16-18 and 20

Claims 16-18 and 20 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,269,153 to Carpenter et al. in view of U.S. Patent 6,330,311 to Mijares, Jr. et al. Applicants respectfully traverse this rejection.

Claim 16 recites a method for automatically routing a telephone call using maximum benefit routing, comprising the steps of: receiving a telephone call from a caller; determining phrases from speech utterances by a caller; inputting said determined phrases to a speech recognizer device; converting said recognized determined phrases into at least one of word stems and word classes; performing keyword lookup on the one of word stems and word classes; generating a feature vector that contains the number of times the at least one word stems and word classes were found in the determined phrase; performing analysis on the feature vector; outputting a posterior possibilities vector; inputting the posterior possibilities vector and

determining the expected benefit of routing the call to each of a predetermined destination; and outputting a benefit sorted vector of destinations, benefits and topic scores.

As disclosed in the specification at paragraph [0033] – [0035], for example,

- [0033] In the preferred embodiment, a call center 32 can be described as having L routing destinations, d_i , and N caller topics, t_j . Maximum benefit routing determination program 30 takes as input an $L \times N$ benefit matrix, B , and an N -dimensional topic-likelihood vector, \mathbf{t} , where
 $\mathbf{t} = P(\text{Topics} \mid \text{Words})$.
 Maximum benefit routing determination program 30 then generates an L -dimensional vector, \mathbf{b} , where
 $\mathbf{b} = \text{Benefit}(\text{Destinations} \mid \text{Words})$,
 the expected benefits as output.
- [0034] The benefit matrix, B , is generated by a person familiar with the costs of handling calls in call center 32. The rows of B represent the destinations for calls, while the columns represent the topics that a caller inquiry may contain. The entries of B define the benefit in seconds of agent time saved by routing to destination d_i when the caller's topic is t_j , or $\text{benefit}(d_i \mid t_j) = b_{ij}$.
- [0035] The caller's topics could be numerous and unwieldy, so a probabilistic topic spotter, or topic identification program 28, is used to generate a topic-likelihood vector, \mathbf{t} . The entries for this vector, t_i , express the probability that the topic, random variable, t , of the call is t_i , given the evidence, $\Pr\{t = t_i \mid e\}$. Here, the evidence is the string of words, $e = \text{Words} = \text{word}_1, \text{word}_2, \dots, \text{word}_n$, that was recognized by speech recognizer 22 from the caller's response to an open-ended prompt. Maximum benefit routing determination program 30 then calculates an output vector, $\mathbf{b} = \mathbf{Bt}$, which contains the expected benefits of routing caller 12 to destinations 32 given their utterance 16, such that

$$\text{Benefit}(d_i \mid \text{Words}) = \epsilon(\text{benefit}(d_i \mid t) \mid \text{Words}) = \sum_{j=1}^N \text{benefit}(d_i \mid t_j) \Pr(t = t_j \mid \text{Words}).$$

Thus, the posterior possibilities vector $\mathbf{t} = P(\text{Topics} \mid \text{Words})$ is input into the maximum benefit routing determination program 30 for calculation of an output vector $\mathbf{b} = \mathbf{Bt}$.

The final Office Action alleges that the vector disclosed in Carpenter et al. '153 at column 5, lines 39-63 discloses that the posterior possibilities vector is output, that this vector is then input into the maximum benefit router to determine the expected benefit of routing the call to each of a predetermined destination, and the resulting output is a benefit sorted vector of destinations, benefits and topic scores. This was also stated in the previous Office Action. However, in response to the previous Office Action, Applicants asserted that, as discussed above,

this is incorrect, and nowhere in the reference is the posterior possibilities vector discussed above disclosed, taught or suggested by Carpenter et al. '153. This was uncontroverted by the examiner in this final Office Action. Accordingly, this element is taken as not being present in the reference, and a prima facie case of obviousness has not been presented.

Still further, Mijares, Jr. et al. '311 is applied for allegedly teaching that the selection from a database of the least expensive low call carrier is the expected benefit of routing the call. However, Mijares, Jr. et al. '311 uses a database that contains, for example, rates for various long distance telephone carriers for various dates and times. According to Mijares, Jr. et al. '311, each carrier may be considered a predetermined destination.

In contrast, claim 16 recites "inputting the posterior possibilities vector and determining the expected benefit of routing the call to each of a predetermined destination." While Mijares, Jr. et al. '311 may teach long distance carriers as predetermined destinations, Mijares, Jr. et al. '311 does not disclose, teach or suggest the inputting of "posterior possibilities vector and determining the expected benefit of routing the call to each of a predetermined destination." Accordingly, a prima facie case of obviousness has not been established, and the rejection should be withdrawn.

Claim 17, depending from claim 16, recites additional elements wherein the analysis is performed on the feature vector using one of a multinomial model, a generalized linear model and a support vector machine. Carpenter et al '153 discloses at col. 5, lines 39 – 63 that the term-frequency matrix 310 is normalized, and then divided by its length to create a normalized matrix. However, Carpenter et al. '153 in view of Mijares, Jr. et al. '311 does not disclose, teach or suggest that the analysis is performed on the feature vector using one of a multinomial model, a generalized linear model and a support vector machine.

Claim 20 recites the step of whether to route the call to a top ranking destination or to reject the utterance if the topic score and/or benefit falls below a predetermined threshold. As discussed above, Carpenter et al. '153 in view of Mijares, Jr. et al. '311 does not disclose, teach or suggest a benefit, and therefore cannot route a call based upon whether a benefit score falls below a predetermined threshold.

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Still further, claim 18, being dependent upon claim 16, is also allowable for the reasons above. Moreover, this claim is further distinguished by the materials recited therein, particularly within the claimed combination. Withdrawal of the §103(a) rejection is therefore respectfully solicited.

C. Conclusion

All rejections having been addressed, it is respectfully submitted that the present application is in condition for allowance, and a Notice to that effect is earnestly solicited.

It is believed that any additional fees due with respect to this paper have already been identified. However, if any additional fees are required in connection with the filing of this paper, permission is given to charge our deposit account number 07-2339.

Respectfully submitted,

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Appendix I

In accordance with 37 CFR 1.121 (c)(1)(ii), amended claims 1 and 14 are set forth in a marked-up version below:

1. (Amended) An automated call routing system that routes a telephone call by responding to a routing objective of a calling party, comprising:

a speech recognizer that determines at least one phrase from a speech utterance made by the calling party and outputs a digital phrase;

a topic identifier that receives the digital phrase and converts the digital phrase to at least one of a word stem and a word class and generates a topic output; and

a maximum benefit router that receives the topic output and determines where to route the telephone call in order to optimize at least one predetermined parameter, said telephone call routed based on maximum benefit.

14. (amended) An automated call routing system that routes a call by responding to a routing objective of a calling party, comprising:

a recognizer that determines at least one phrase made by the calling party and outputs a second phrase;

a topic identifier that receives the second phrase and converts the second phrase to at least one of a word stem and a word class and generates a topic output; and

a maximum benefit router that receives the topic output and determines where to route the call in order to optimize at least one predetermined parameter, said telephone call routed based on maximum benefit.